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Technical Report 835

# An Evaluation of the Aviation Resource Management Survey (ARMS) Checklist: Volume I

John W. Ruffner and D. Michael McAnulty  
Anacapa Sciences, Inc.

May 1989

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United States Army Research Institute  
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**Technical Report 835**

# **An Evaluation of the Aviation Resource Management Survey (ARMS) Checklist: Volume I**

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## FOREWORD

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The U.S. Army Research Institute Aviation Research and Development Activity (ARIARDA) at Fort Rucker, Alabama, is responsible for research and development that will increase the effectiveness of Army aviator training. The responsibilities encompass training for both Active Component (AC) and Reserve Component (RC) aviators.

As part of the Army's "total force" concept, RC aviators are required to train to the same standards and to maintain the same levels of flight proficiency and flight safety as AC aviators. Since RC aviators must meet this requirement with limited resources, the individuals responsible for planning, implementing, and evaluating RC training must manage the resources available to them efficiently. The Army helps RC training managers achieve efficiency through evaluation visits from Aviation Resource Management Survey (ARMS) teams.

This report documents the results of a questionnaire survey designed to evaluate the First Army ARMS Checklist and the procedures used to administer the checklist. The results of the survey provide information that can be used by the First Army ARMS team to improve the quality of the checklist and to conduct evaluation visits more efficiently. As part of the research effort, an information data base was developed that will help Army managers organize, interpret, and summarize the results of ARMS visits.

Mr. Charles A. Gainer, Chief, ARIARDA, Fort Rucker, Alabama, was the technical monitor for the project. The research was completed under the Letter of Agreement between the Deputy Chief of Staff for Training (DCST), First U.S. Army and the Army Research Institute, Subject: Aviation Resource Management Survey. The results of the research were briefed to Colonel Vay, First Army DCST, and Lieutenant Colonel Beasley, Chief, Aviation Division, DCST, on June 3, 1986, at First Army Headquarters, Fort Meade, Maryland, and to staff members of the Aviation Division, DCST, on March 28, 1987, during the First Army Aviation Standardization Conference in Baltimore, Maryland. The Aviation Division personnel applied the results of the research when they revised the ARMS Checklist during Fiscal Year 1987.

This report is divided into two volumes. Volume I contains the primary report and Appendixes A and B. Volume II contains Appendix C and the ARMS Checklist Data Base. The data in Appendix C are also available on floppy disc in a dBASE III file in MS-DOS format.

A handwritten signature in cursive script, reading "Edgar M. Johnson". The signature is written in dark ink and is positioned above the printed name and title.

EDGAR M. JOHNSON  
Technical Director

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The authors wish to express their appreciation to the following individuals for their contributions to this research effort.

Lieutenant Colonel Charles Slimowicz, Aviation Division, Deputy Chief of Staff for Training, First U.S. Army Headquarters, who served as the First Army point of contact for the project and provided valuable assistance and guidance. Members of the First Army Aviation Resource Management Survey (ARMS) team spent many hours with project personnel demonstrating the procedures that they followed during an ARMS visit and discussing their respective areas of expertise.

The authors also wish to acknowledge the First Army National Guard and U.S. Army Reserve aviators who completed the survey questionnaires during their limited training time.



AN EVALUATION OF THE AVIATION RESOURCE MANAGEMENT SURVEY (ARMS)  
CHECKLIST: VOLUME I

EXECUTIVE SUMMARY

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This report describes the results of research that evaluated the First U.S. Army Aviation Resource Management Survey (ARMS) Checklist and the procedures used to administer the checklist. The research was conducted by the U.S. Army Research Institute Aviation Research and Development Activity (ARIARDA) at the request of the First Army Deputy Chief of Staff for Training (DCST).

Requirement:

As part of the Army's "total force" concept, Reserve Component (RC) aviators are required to train to the same standards and to maintain the same levels of flight proficiency and flight safety as aviators serving in the Active Component (AC). Since RC aviators must meet this requirement with limited resources, the individuals responsible for planning, implementing, and evaluating RC training must manage the resources available to them efficiently.

The Army helps RC training managers achieve efficiency through evaluation visits made by ARMS teams. The general purposes of the ARMS, as defined by the U.S. Army Forces Command (FORSCOM), are the following:

- to evaluate the management of First Army National Guard (ARNG) and U.S. Army Reserve (USAR) aviation programs,
- to identify areas requiring additional emphasis, and
- to provide staff assistance as necessary.

The First Army ARMS team's evaluation efforts are guided by a written checklist containing 670 items organized into 11 functional areas of evaluation (e.g., safety, maintenance). Each item describes a deficiency that may result in (a) the failure of an aviation support facility to perform its support mission, or (b) the failure of an aviation unit to perform its mobilization combat mission. The First Army DCST recognized that there may be problems with the current ARMS Checklist and requested ARIARDA's assistance in evaluating and revising the checklist.

This project has three general objectives: (a) to perform a systematic evaluation of the content of the First U.S. Army ARMS Checklist, (b) to develop a set of recommendations for improving the ARMS Checklist and the procedures used to administer it, and

(c) to develop an information data base for organizing and analyzing ARMS Checklist data.

#### Procedure:

A preliminary review of the First Army ARMS program identified the following specific problems in the checklist content and evaluation procedures:

- The ARMS Checklist is excessively long. There are many items that may not be related to mission success.
- The procedures used to evaluate checklist items and to combine ratings from the various functional areas into an overall rating are not standardized.
- The negatively worded item format is contrary to guidelines derived from research on sentence comprehension.
- The items are not listed in an order that allows an inexperienced evaluator to proceed efficiently through the evaluation steps.
- The items are not identified as specific to an aviation facility, an aviation unit, or both.
- Many items are too general to be associated with observable conditions or events.
- There is no systematic procedure for collating information about commonly occurring deficiencies observed across facilities or units during one year.

Feedback from the preliminary review led to the identification of three criteria that each item should meet to be on the checklist. Specifically, an item should be retained only if the deficiency addressed in the item (a) is easily detectable during an ARMS visit (Detectability), (b) is important for judging the status of one of the functional areas (Importance), and (c) is critical for mission success (Criticality). The extent to which the checklist items in each of the functional areas meet the three criteria was assessed by survey questionnaires. A different questionnaire was developed for each of the functional areas. Respondents to the questionnaires were aviators and aviation technicians from ARNG and USAR aviation support facilities and aviation units.

#### Findings:

The results indicate that, on the average, the Detectability and Importance of the deficiencies described on the checklist were rated moderate to high, while the Criticality was rated low.

The low Criticality ratings may indicate that the majority of the deficiencies described in the items could exist in isolation in a facility or in a unit without adversely affecting the ability of a facility or a unit to accomplish its mission. It is not possible to conclude from the results what the combined effect of two or more deficiencies might be. The rating distributions and the rating scale verbal anchors suggest that different criteria may be appropriate for determining if an item is low or high on the Detectability, Importance, and Criticality scales.

The Detectability, Importance, and Criticality ratings for a facility and for a unit are very similar, suggesting that there is no need to develop different checklists for a facility and a unit. Rather, a single checklist should be developed in which the items that pertain only to a facility or only to a unit are clearly identified.

A procedure was developed for using the Detectability, Importance, and Criticality information to decide whether to retain, revise, or delete individual checklist items. The procedure should be applied to the ratings for both a facility and a unit.

An ARMS Checklist data base was developed to summarize (a) the ARNG and USAR aviators' ratings of the Detectability, Importance, and Criticality of the checklist items, and (b) the performance of ARNG and USAR units on specific checklist items and functional areas during future ARMS visits. A printed copy of the data base is included in Volume II of this report; the data base is available on floppy disc in a dBASE III file in MS-DOS format.

#### Utilization of Findings:

The primary recommendations of this research are:

- The decision to retain, revise, or delete a checklist item should be based on an assessment of the item's Criticality, Importance, and Detectability ratings for both a facility and a unit.
- A single version of the checklist should be used, rather than separate versions for a facility and a unit. Items that pertain only to a facility or only to a unit should be identified on the single checklist.
- The ARMS Checklist Data Base should be used for making improvements to the checklist format and for identifying commonly occurring deficiencies in RC units.

## GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AARM	- Aviation Armament
AC	- Active Component
ACR	- Aviation Crash, Rescue, and Firefighting
AFLO	- Aircraft and Flightline Operations
ALSE	- Aviation Life Support Equipment
AMM	- Aeromedical Management
AR	- Army Regulation
ARCOM	- Army Command
ARIARDA	- Army Research Institute Aviation Research and Development Activity
ARMS	- Aviation Resource Management Survey
ARNG	- Army National Guard
ASM	- Aviation Safety Management
AST	- Aviation Standardization and Training
CART	- Centralized Aviation Readiness Team
CO	- Commissioned Officer
CONUSA	- Continental U.S. Army
DA	- Department of the Army
DCST	- Deputy Chief of Staff for Training
DES	- Directorate of Evaluation and Standardization
FORSCOM	- Forces Command
FUO	- Facility/Unit Operations
LOG	- Aviation Logistics
MTFS	- Maintenance Test Flight Standardization
MTM	- Maintenance Management Training
MUSARC	- Major U.S. Army Reserve Command
NCO	- Noncommissioned Officer
NGR	- National Guard Regulation
POC	- Point of Contact
POL	- Petroleum, Oil, and Lubricants
PSEC	- Physical Security
RC	- Reserve Component
SAAO	- State Army Aviation Officer
SIP	- Standardization Instructor Pilot
SME	- Subject Matter Expert
TRADOC	- Training and Doctrine Command
USAR	- United States Army Reserve
WO	- Warrant Officer

AN EVALUATION OF THE AVIATION RESOURCE MANAGEMENT SURVEY (ARMS)  
CHECKLIST: VOLUME I

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AN EVALUATION OF THE AVIATION RESOURCE  
MANAGEMENT SURVEY (ARMS) CHECKLIST:  
VOLUME I

INTRODUCTION

Background

According to the Army's "total force" concept, Reserve Component (RC) aviators serving in the U. S. Army Reserve (USAR) and the Army National Guard (ARNG) are required to train to the same standards and to maintain the same levels of flight proficiency and flight safety as aviators serving in the Active Component (AC). RC aviators must meet these requirements with limited resources. Therefore, the individuals who are responsible for planning, implementing, and evaluating RC training must manage the available resources (e.g., aircraft, training time, flying hours, instructor pilots) efficiently.

One of the ways that the Army helps RC training managers achieve efficiency is through evaluation visits from Aviation Resource Management Survey (ARMS) teams. U. S. Army Forces Command (FORSCOM) Regulation 350-3 (1984) states that the general purposes of the ARMS are to evaluate the management of unit aviation programs, to identify management practices that require improvement, and to provide staff assistance as necessary. As defined by FORSCOM, the ARMS has four specific objectives:

- to help commanders identify strengths and weaknesses in all aviation-related programs;
- to assess an aviation support facility's capacity to support the training of units assigned to the facility;
- to assess the aviation unit's capabilities (a) to operate safely, efficiently, and effectively, and (b) to maintain aviation resources apart from the aviation support facility while accomplishing its mobilization mission; and
- to identify problems and coordinate assistance required to solve problems that are beyond the facility commander's or unit commander's sphere of authority.

The Deputy Chief of Staff for Training (DCST) in each of the five Continental U. S. Armies (CONUSAs) is responsible for conducting ARMS evaluations. According to FORSCOM Regulation 350-3 (1984), an ARMS is to be conducted at least once a year for each USAR facility and unit, and at least once every two years for each ARNG facility and unit within each CONUSA.

FORSCOM formally established the Guide to Aviation Resources Management for Aircraft Mishap Prevention (1984), published by the U. S. Army Safety Center, as the standard reference publication for the ARMS. In practice, each CONUSA



uses its own checklist and its own procedures for carrying out its ARMS evaluations. Most of the checklists are based on the Army Safety Center publication. However, across the CONUSAs, there are differences in the functional areas (e.g., safety, maintenance) evaluated, the procedures used to assess the status of facilities and units, and the standards for acceptable performance.

The First Army DCST requested that the U. S. Army Research Institute Aviation Research and Development Activity (ARIARDA) provide assistance in evaluating and revising the ARMS Checklist and procedures. The request for assistance was prompted by concern about problems with (a) the content of the checklist, (b) the manner in which the checklist items are used to evaluate RC facilities and units, and (c) the management and utilization of information obtained from ARMS visits.

### Preliminary Review

ARIARDA responded by conducting a preliminary review of the First Army ARMS program. The ARIARDA project director met with representatives of the Aviation Division, First Army DCST, Fort Meade, Maryland, in June 1985. The objectives of that meeting were (a) to discuss the background and purpose of the ARMS, (b) to review the content of the checklist, and (c) to discuss the procedures followed during an ARMS evaluation. Subsequently, in August 1985, the ARIARDA project director observed a First Army ARMS team performing an evaluation of the USAR facility at Fort Devens, Massachusetts. During the evaluation, the techniques used to assess the checklist items and to determine a rating of Satisfactory/Unsatisfactory in each functional area were observed. In addition, the team members discussed their assessments of the checklist with the project director. They also provided suggestions for improving the checklist content and its administrative procedures.

The discussions at Fort Meade and the observations at Fort Devens provided background information that was essential to the planning and conduct of this research. A brief description of the First Army Checklist, the composition of the ARMS team, and the ARMS evaluation and feedback procedures are presented below.

First Army ARMS Checklist. The First U. S. Army DCST, Aviation Division, developed the ARMS Checklist to be used during evaluation visits. The checklist was published in October 1983 as First Army Pamphlet 95-1, Reserve Component Commander's Guide - Aviation Standardization and Training Program Evaluation and Aviation Resource Management Survey. First Army Pamphlet 95-1 subsequently was revised and published again in August 1985. The checklist draws heavily from FORSCOM FORM 14-1-R, Reserve Component Aviation Resource Management Survey Checklist (1980), and the Army Safety Center

publication referenced previously. An abridged version of the First Army ARMS Checklist is presented in Appendix A to illustrate the content of the checklist. For the sake of brevity, only the introductory material and two pages of checklist items are included in the abridged version to illustrate the item format. A complete listing of the checklist items is included in Volume II of this report.

The First Army ARMS Checklist contains 670 items that are organized into 11 functional areas of evaluation. The checklist items were written by aviation subject matter experts (SMEs) who are knowledgeable in each of the functional areas about (a) the operational requirements of RC support facilities, and (b) the mobilization mission requirements for RC units.

Table 1 lists the functional areas in the same order as they are presented in the First Army ARMS Checklist. Table 1 also reports the number and percentage of checklist items within each functional area. Depending on the type of facility or unit visited, one or more of the functional areas may be inappropriate for evaluation. For example, the ARMS

Table 1

Functional Areas And Items Contained in First Army ARMS Checklist

Functional Area	Number of Items	Percentage of Items
Aviation Safety Management <sup>a</sup>	67	10.0
Facility/Unit Operations <sup>a</sup>	69	10.3
Standardization and Training <sup>a</sup>	99	14.8
Aircraft/Flightline Operations <sup>a</sup>	20	3.0
Aeromedical Management	23	3.4
Crash, Rescue, and Fire Fighting	37	5.5
Petroleum, Oil, and Lubricants	40	6.0
Maintenance Management <sup>a</sup>	240	35.8
Aviation Armament	24	3.6
Aviation Life Support Equipment <sup>a</sup>	29	4.3
Physical Security	22	3.3
Total	670	100

<sup>a</sup>Core functional areas.

team would not evaluate Aviation Armament (AARM) during a visit to a facility that only supports Aeromedical and Transportation units. Six of the 11 areas (see Table 1) are considered "core" areas and are evaluated during every ARMS visit.

Each checklist item describes a specific deficiency that may result in (a) the failure of a facility to accomplish its mission of supporting its assigned RC units, or (b) the failure of a unit to accomplish its mobilization combat mission. The majority (93%) of the checklist items are worded as negative statements (e.g., "The Aviation Safety Officer was not school trained.") rather than as positive questions (e.g., "Was the Aviation Safety Officer school trained?") so that they may be reproduced verbatim in informal and formal reports.

First Army ARMS team. The First Army ARMS team normally consists of the following core members: a Team Leader, a Standardization and Training Officer, an Aviation Safety Officer, an Aviation Maintenance Noncommissioned Officer (NCO), and a Flight Operations NCO. Typically, each ARMS team member is responsible for evaluating more than one functional area.

The core members of the evaluation team are supported by Standardization Instructor Pilots (SIPs) from the Directorate of Evaluation and Standardization (DES), U. S. Army Aviation Center, Fort Rucker, Alabama. The DES SIPs evaluate the inflight performance of key facility and unit aviators (e.g., unit standardization pilot, safety officer). When required by the type of the USAR or ARNG facilities and units, the team is augmented with Maintenance Test Flight Evaluators from the Directorate of Evaluation and Standardization, U. S. Army Aviation Logistics School, Fort Eustis, Virginia, and by technicians from the U. S. Army General Materiel and Petroleum Activity, New Cumberland Army Depot, Pennsylvania.

Evaluation procedures. During an ARMS visit, the ARMS team typically spends two days evaluating a facility and two days evaluating one of the units training at the facility. First, the ARMS team leader conducts an entrance briefing for the facility or unit commander and staff members. The ARMS team leader introduces the ARMS team members and explains the procedures to be followed during the evaluation. After the entrance briefing, the ARMS team members meet individually with the appropriate facility or unit personnel to evaluate the functional areas, using the ARMS Checklist as a general guide.

At the conclusion of the ARMS evaluation, a rating of "Satisfactory" or "Unsatisfactory" is assigned to each of the

functional areas by the appropriate ARMS team member. Using the functional area ratings, the ARMS team leader assigns an overall rating of "Satisfactory" or "Unsatisfactory" to a facility or unit. According to the First Army Pamphlet 95-1, the overall rating for a facility or a unit should consider the relative significance of the functional areas to (a) overall safety practices, (b) the degree to which the facility or unit has complied with directives, and (c) training effectiveness and readiness. Although there are no strict guidelines for combining information about the functional areas into an overall rating, the following two general decision rules have been developed:

- A rating of "Unsatisfactory" on any two of the six core areas identified in Table 1 will result in an overall rating of "Unsatisfactory."
- A rating of "Unsatisfactory" on any one of the core areas and on any two of the remaining areas will result in an overall rating of "Unsatisfactory."

Feedback procedure. After an evaluation of a facility or unit has been completed, the members of the ARMS team conduct an informal exit briefing and provide the facility or unit personnel with a copy of the ARMS Checklist with the observed deficiencies circled. Upon concluding an ARMS evaluation conducted for a USAR facility or unit in a Major U. S. Army Reserve Command (MUSARC), the ARMS team conducts a formal exit briefing for a designated representative of the MUSARC Commander. Upon concluding an ARMS for an ARNG facility or unit in a state, the ARMS team conducts a formal briefing for a representative of the state Adjutant General. A formal ARMS report is written and sent to the RC command personnel within 60 days after the evaluation. The report lists the specific deficiencies observed and recommends actions that should be taken to correct the deficiencies. When appropriate, the report also identifies areas in which the facility or unit excelled. First Army requires that deficient facilities or units submit Corrective Action Plans indicating how specific deficiencies will be corrected.

Copies of the written ARMS report and the facility or unit Corrective Action Plan also are sent to one of the Centralized Aviation Readiness Teams (CART) within the First Army area. The mission of the CARTs is to provide training assistance and expertise to RC units, particularly in the functional areas for which deficiencies were identified during an ARMS visit. Individuals from the ARMS team and the CARTs coordinate their activities to help the RC facilities and units to identify and correct deficiencies. CART assistance is not mandatory, but may be requested by the individual RC facility or unit.

Checklist problems. During the preliminary review the following specific problems in the checklist content and evaluation procedures were identified:

- The ARMS Checklist is excessively long. There are many items that may not be highly related to mission success.
- The procedures used to evaluate checklist items and to combine ratings from the various functional areas into an overall rating are not standardized.
- The negatively worded item format is contrary to guidelines derived from research on sentence comprehension. Carpenter and Just (1975) demonstrated that sentences containing negatives take longer to process than sentences containing only positive assertions. In designing checklists, instructions should contain positive assertions, if possible (Wickens, 1984).
- The items are not listed in an order that allows an inexperienced evaluator to proceed efficiently through the evaluation steps.
- The items are not identified as applicable specifically to an aviation facility, an aviation unit, or both.
- Many items are too general to be associated with observable conditions or events.
- There is no systematic procedure for collating information about commonly occurring deficiencies observed across facilities or units during one year.

### Research Objectives

To the extent permitted by the available time and resources, each of the problems identified above was addressed during this research. The general objectives of the ARMS Checklist research are:

- to perform a systematic evaluation of the content of the First U. S. Army ARMS Checklist,
- to develop a set of recommendations for improving (a) the ARMS Checklist and (b) the procedures used to administer it, and
- to develop an information data base for organizing and analyzing ARMS Checklist data.

## METHOD

### Overview of Research Approach

The results of the preliminary evaluation of the ARMS Checklist content and procedures were used to formulate a research approach for accomplishing the research objectives. The research approach comprised six primary tasks:

1. identify the checklist items to be evaluated;
2. establish the criteria for retaining, revising or deleting checklist items;
3. obtain evaluative judgments about the checklist items from facility and unit aviation personnel;
4. obtain evaluative judgments about the checklist items from aviation SMEs;
5. recommend steps to improve the checklist content and procedures; and
6. develop a data base that summarizes information about the checklist items and the results from ARMS evaluations.

As will be described in a later section, the fourth research task (obtain aviation SME judgments) was not accomplished because of unavailable resources. The other research tasks were accomplished as described in the paragraphs that follow.

### Review and Revise Checklist Items

During October 1985, the checklist was reviewed to identify items that were no longer current or relevant to any of the functional areas. The review was accomplished by sending copies of the checklist to three First Army ARNG facilities and to three First Army USAR facilities. A point of contact (POC) was appointed by the commander at each target facility. Each POC instructed three or four key staff members (e.g., Operations Officer, Maintenance Technical Inspector, Safety Officer) to examine the checklist carefully and to identify items that were no longer current or relevant. The facility POCs returned their copies of the checklist containing the identified items to the First Army ARMS team; the ARMS team reviewed the responses from the ARNG and USAR facilities. This review resulted in the deletion of 36 items; the remaining 634 items were evaluated using the procedures described below.

### Establish Checklist Item Retention Criteria

The purpose of this task was to establish the criteria that each item should meet to be retained in the ARMS Checklist. After considering the intended purpose of the checklist, the problems with the checklist described previously, and the guidelines set forth in the literature for performance measurement scales (e.g., Landy & Farr, 1983), three criteria were established for retaining checklist items:

- The deficiency described in the checklist item should be detected without excessive effort during an ARMS visit (Detectability).
- The deficiency described in the checklist item should be weighted heavily when evaluating the functional area for which it is intended, whether applied to a facility, to a unit, or to both (Importance).
- The deficiency described in the checklist item should be deleterious to (a) the facility's capability to support unit training or (b) the unit's capability to perform its mobilization mission (Criticality).

The researchers developed rating scales designed to collect SME judgments on the Detectability, Importance, and Criticality of each item. The draft versions of the rating scales were reviewed and critiqued by members of the First Army ARMS team in October 1985. Minor wording changes were made to the rating scales as a result of the review. The extent to which each item met the three criteria was assessed by using the rating scales described in the following paragraphs.

Detectability. Detectability was defined as "the relative ease or difficulty of determining during an ARMS visit if the deficiency described in the checklist item exists in a facility or in a unit." The respondents rated the Detectability of the deficiency described in each checklist item by responding to the following rating question:

How much effort would it take to detect the deficiency described in this item when evaluating a facility/unit during an ARMS visit?

[1]	[2]	[3]	[4]	[5]
It would take almost no effort to detect this deficiency	It would take a moderate but not an extensive amount of effort to detect this deficiency		It would take a great deal of effort to detect this deficiency	

The Detectability items were scaled on the rating form such that a low score indicated a good item and a high score indicated a poor item.

Importance. Importance was defined as "the amount of weight that the deficiency described in the item should be given when evaluating the status of a facility or of a unit in a specific functional area." The respondents rated the Importance of the deficiency described in each checklist item by responding to the following rating question:

How much weight should the deficiency described in this item be given when evaluating a functional area in a facility/unit?

[1]	[2]	[3]	[4]	[5]
The deficiency should be given little or no weight	The deficiency should be given a moderate amount of weight	The deficiency should be given a great deal of weight		

The Importance items were scaled on the rating form such that a high score indicated a good item and a low score indicated a poor item.

Criticality. Criticality was defined as "the extent to which a facility or a unit with the deficiency would be capable of performing its mission in a satisfactory manner." The respondents rated the Criticality of the deficiency described in each checklist item as it applies to a facility by responding to the following rating question:

To what extent could a facility with the deficiency described in this item support the training of a Reserve Component unit?

[1]	[2]	[3]	[4]	[5]
The facility could support very few aspects of unit training	The facility could support 40-60% of unit training	The facility could support nearly all aspects of unit training		

The respondents rated the Criticality of the deficiency described in each checklist item as it applies to a unit by responding to the following rating question:

To what extent could a unit with the deficiency described in this item perform its mobilization mission in a satisfactory manner?



[1]	[2]	[3]	[4]	[5]
The unit could perform very few of its mobilization tasks		The unit could perform 40-60% of its mobilization tasks		The unit could perform almost all of its mobilization tasks

The Criticality items were scaled on the rating form such that a low score indicated a good item and a high score indicated a poor item. The directions in which the Detectability and Criticality items were scaled were different from the Importance items to minimize the effect of response bias.

#### Content of the Rating Booklets

The checklist items were grouped into the appropriate functional areas and assembled into prototype rating booklets. To keep the rating booklets to a manageable length, the items in two of the functional areas were subdivided into smaller groups of items. Specifically, the items in the Standardization and Training functional area were divided into one group of maintenance test flight standardization items and another group of standardization and training items. In a similar manner, the items in the Maintenance Management functional area were divided into groups of maintenance management training items, maintenance quality control items, maintenance shop operations items, and aviation logistics items. This item grouping resulted in a new total of fifteen functional areas. A separate booklet, containing the appropriate checklist items, was developed for each of the fifteen functional areas.

The first two pages of each rating booklet contained the rating instructions and Privacy Act statement. On the third page of each rating booklet, the respondents were instructed to provide the last four digits of their social security number. The four-digit identifier was used for administrative management of the data. The respondents also were asked to provide the following military demographic information:

- category of present duty position,
- years in present duty position,
- CONUSA to which assigned,
- total years of military service,
- total number of military flight hours,
- functional area of greatest expertise,
- years of service in the ARNG, and
- years of service in the USAR.

The rating scale definitions were listed on the fourth page of each rating booklet. The respondents were instructed to read the definitions carefully before proceeding to the rating task and to review the definitions as necessary. In addition, the respondents were instructed to assume that the deficiency described in the item was the only deficiency that existed in a facility or in a unit. Two sample items were provided on the next two pages of each booklet.

Each of the remaining pages in the booklet listed the specific item to be rated, the functional area, and the three scales as they apply first to a facility and second to a unit. An alphanumeric identifier was placed at the bottom right-hand portion of each page for administrative management of the forms.

An abridged version of the rating booklet for the Aircraft and Flightline Operations functional area is presented in Appendix B to illustrate the content of the rating booklets. For the sake of brevity, only the introductory material and two of the Aircraft and Flightline Operations rating items are shown in the abridged version.

#### Pretesting the Rating Booklets

During weekend drill periods in November 1985, the prototype rating booklets were pretested with three aviators from the 345th Army Security Agency company, 79th Army Command (ARCOM), Willow Grove Naval Air Station, Pennsylvania, and with three aviators from the 327th Aviation Company, 97th ARCOM, Fort Meade, Maryland. The aviators were told the purpose of the research project and were asked to complete a prototype rating booklet. The aviators then were asked specific questions about their interpretations of the rating items and were encouraged to suggest revisions to the content and format of the prototype rating booklets. Members of the research team used the information obtained during the pretest to make minor changes to the prototype rating booklets. No additional changes were made to the rating scales. The rating booklets then were produced in final form.

#### Administration of the Rating Booklets

The booklets containing the checklist rating items were mailed to the First Army ARNG State Aviation Officers (SAAOs) and to the MUSARC commanders during March 1986. A sufficient number of rating booklets were distributed to enable a representative from each facility and a representative from one of the units assigned to each facility to complete a booklet for each functional area. The booklets were accompanied by a cover letter from the First Army DCST explaining the purpose of the project. The SAAOs and MUSARC commanders, in turn, distributed the rating booklets to ARNG and USAR aviators and nonrated aviation personnel (e.g., maintenance technical inspectors) who were responsible for managing one or more of

the functional areas covered in the ARMS Checklist. In some cases, a respondent completed a booklet for more than one area, but only if (a) the respondent possessed sufficient expertise in the area(s), and (b) another qualified respondent was not available. The rating booklets were completed by ARNG and USAR aviation personnel during April and May 1986; they were then returned to ARIARDA for processing and data analysis.

### Revision of the Project Scope

As noted previously, the research approach required that the Detectability, Importance, and Criticality of the checklist items be rated by ARNG and USAR aviation personnel and by a group of aviation SMEs. The aviation SMEs were intended to be (a) members of ARMS teams and CARTs from the six CONUSAs, and (b) technical specialists from the DES at the U. S. Army Aviation Center, the U. S. Army General Materiel and Petroleum Activity, and the U. S. Army Safety Center. However, due to the unavailability of the aviation SMEs, ratings were collected only from ARNG and USAR facility and unit aviation personnel.

### Development of the ARMS Checklist Data Base

To meet the third project objective, an ARMS Checklist data base was developed. The data base was designed (a) to summarize information about each of the checklist items, and (b) to serve as a tool for organizing the checklist items into a format that will facilitate the ARMS evaluations. The following information was incorporated into the data base:

- a unique alphanumeric item identifier;
- the DCST Aviation Division word processing glossary code;
- the name of the checklist item;
- the functional area under which the item is classified;
- the functional subarea;
- the rating results for facilities and units;
- the paragraph(s) and the number(s) of the publication(s) used to establish the evaluative standard for the item; and
- the full name(s) of the publication(s) referenced.

A printed copy of the data base is presented as Appendix C in Volume II of this report. The data in Appendix C also are available on floppy disc in a dBASE III file in MS-DOS format.

### Development of Checklist Revision Procedure

A recommended procedure for revising the checklist was developed as part of this research. The procedure includes a set of decision rules for deciding whether to retain, revise, or delete checklist items. Implementation of the decision rules is based on the Detectability, Importance, and Criticality ratings of the individual checklist items. The procedure for revising the checklist, including the decision rules, is presented in a separate section following the Results section of this report.

## RESULTS

### Demographic Characteristics of the Respondents

A total of 345 rating booklets was returned from 259 aviation personnel. As noted previously, some respondents completed booklets in more than one functional area. Approximately 70% of the booklets were from the ARNG and 30% were from the USAR. Table 2 presents, by functional area, the percentage of respondents for five types of duty positions. The first column in Table 2 shows the number of respondents in each functional area. The second and third columns present the

Table 2

Percentage of Respondents in Each Functional Area from ARNG and USAR Aviation Facilities or Units

Functional Area	n <sup>a</sup>	Facility		Unit		Other
		Technicians	Personnel	ARNG	USAR	
Aviation Safety Management	25	56	8	20	12	4
Facility/Unit Operations	27	56	7	4	14	19
Standardization and Training	28	48	14	7	10	21
Maintenance Test Flights	25	48	8	16	8	20
Aircraft/Flightline Operations	22	54	5	9	14	18
Aeromedical Management	17	41	0	29	12	18
Crash, Rescue, and Firefighting	12	75	0	8	8	9
Petroleum, Oil, and Lubricants	27	62	0	23	8	7
Maintenance Management Training	28	36	14	18	14	18
Maintenance Quality Control	23	61	13	9	13	4
Maintenance Shop Operations	26	68	12	4	4	12
Aviation Logistics	24	58	8	21	13	0
Aviation Armament	12	36	0	27	18	19
Aviation Life Support Equipment	26	54	8	12	12	14
Physical Security	23	56	12	8	8	16

<sup>a</sup>Number of respondents in each functional area.

the percentage of respondents who were full-time ARNG or USAR aviation facility technicians.<sup>1</sup> The fourth and fifth columns present the percentage of respondents who were members of ARNG or USAR units, but were not full-time technicians. Finally, the last column in Table 2 presents the percentage of respondents who classified themselves in other types of duty positions. In general, the majority of respondents were ARNG facility technicians; USAR facility technicians provided the fewest responses.

Table 3 shows the percentage of respondents, by functional area, who were noncommissioned officers, warrant officers, or commissioned officers. The percentage of respondents in each grade varied widely among the functional areas of responsibility.

Table 3

Percentage of Noncommissioned Officer (NCO), Warrant Officer (WO), or Commissioned Officer (CO) Respondents

Functional Area	n <sup>a</sup>	NCO	WO	CO
Aviation Safety Management	25	4	72	24
Facility/Unit Operations	27	7	26	67
Standardization and Training	28	0	44	56
Maintenance Test Flights	25	0	60	40
Aircraft/Flightline Operations	22	27	32	41
Aeromedical Management	17	35	18	47
Crash, Rescue and Firefighting	12	45	36	19
Petroleum, Oil, and Lubricants	27	63	26	11
Maintenance Management Training	28	24	64	12
Maintenance Quality Control	23	57	21	22
Maintenance Shop Operations	26	46	35	19
Aviation Logistics	24	48	10	42
Aviation Armament	12	50	8	42
Aviation Life Support Equipment	26	62	19	19
Physical Security	23	4	61	35

<sup>a</sup>Number of respondents in each functional area.

<sup>1</sup>Aviators who hold positions as full-time federal facility technicians in the ARNG or the USAR are required to belong to a unit. Respondents in this category are included in the percentages of respondents reported in the second and third columns of Table 2.

The median number of years of military service for all respondents in various functional areas ranged from 16.6 years (Aeromedical Management) to 21.0 years (Maintenance Shop Operations), with an overall median of 18.3 years. The median number of years that the respondents from the various functional areas had spent in their present duty position ranged from 1.7 years (Physical Security) to 8.0 years (Maintenance Quality Control), with an overall median of 3.4 years.

#### Questionnaire Data Summary

This section presents the results of the Detectability, Importance, and Criticality ratings of the checklist items. Following a description of the rating scale treatment, the data are presented for the individual items and in summary form for each functional area.

Rating scale treatment. To make the interpretation of the ratings consistent for all three scales, the original Detectability and Criticality ratings were transposed so that a low rating category indicates a poor item (i.e., one that probably should be considered for revision or deletion from the checklist) and a high rating category indicates a good item (i.e., one that probably should be retained in the checklist). The Importance ratings were already scaled in the appropriate direction. All subsequent data on each scale are presented in the low-to-high, poor-to-good format.

Examination of the rating scale distributions for the individual checklist items (see Appendix C, Volume II) indicates that the ratings are not normally distributed, thus precluding the use of parametric statistics (e.g., the mean and standard deviation) to describe the rating data. Instead, the percentage of respondents in each rating scale category (1 = low; 5 = high) is presented for each item.

Item level data. The percentage of responses in each rating scale category and the number of respondents for each item on the Detectability, Importance, and Criticality scales are presented in the ARMS Checklist Data Base (see Appendix C, Volume II). The ratings are presented separately for the RC facilities and units. The items in Appendix C are organized into functional areas; the functional areas and the items within each functional area are listed in the same order as in the ARMS Checklist

Figure 1 illustrates the format used for each item in the data base. As discussed in the Method section (see p. 12), the items are identified by both an ARIARDA data processing identifier (Item) and a First Army word processing code (Code) to facilitate cross referencing. The codes are followed by the functional subarea, the name of the item, the facility and unit

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Item: ASM001      Code: 226/c Subarea: Aviation Safety Officer  
Name: An Aviation Safety Officer had not been authorized/assigned

	<u>Rating Category</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Facility Ratings: (n = 24)	Detectability	4	0	0	8	88
	Importance	4	0	8	8	79
	Criticality	38	21	29	4	8
Unit Ratings: (n = 21)	Detectability	0	0	5	14	81
	Importance	0	0	10	19	71
	Criticality	33	14	43	5	5

Publication para 1-6d, AR 385-95; para 1-4d, NGR 385-10;  
Number(s): FORSCOM/TRADOC Suppl 1 to AR 385-95

Publication Army Aviation Accident Prevention; Army  
Name(s): National Guard Safety Program

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Figure 1. Example of item summary information from ARMS  
Checklist Data Base.

ratings for each scale, and data on the publications used to establish the evaluative standards for the item.

In item ASM001, the results for the facility and unit ratings are very similar. The deficiency identified by the item is rated as very easy for the ARMS team to detect, and the item is rated as very important in the evaluation of the functional area. The deficiency is rated as slightly to moderately critical for mission performance, and slightly more critical for a unit than for a facility.

Facility/unit comparisons. Figures 2 through 7 graphically show the response percentage distributions averaged across functional areas for the Detectability, Importance, and Criticality scales. Figures 2, 4, and 6 present the facility distributions; Figures 3, 5, and 7 present the unit distributions.

Two conclusions can be drawn from the data presented in Figures 2 through 7. First, within each rating scale, the response percentage distributions for facilities are almost identical to those for the units. As a result, the facility and unit data are combined in Tables 4, 5, and 6. Second, the distributions for the Detectability and Importance scales are similar to each other but differ markedly from the distributions



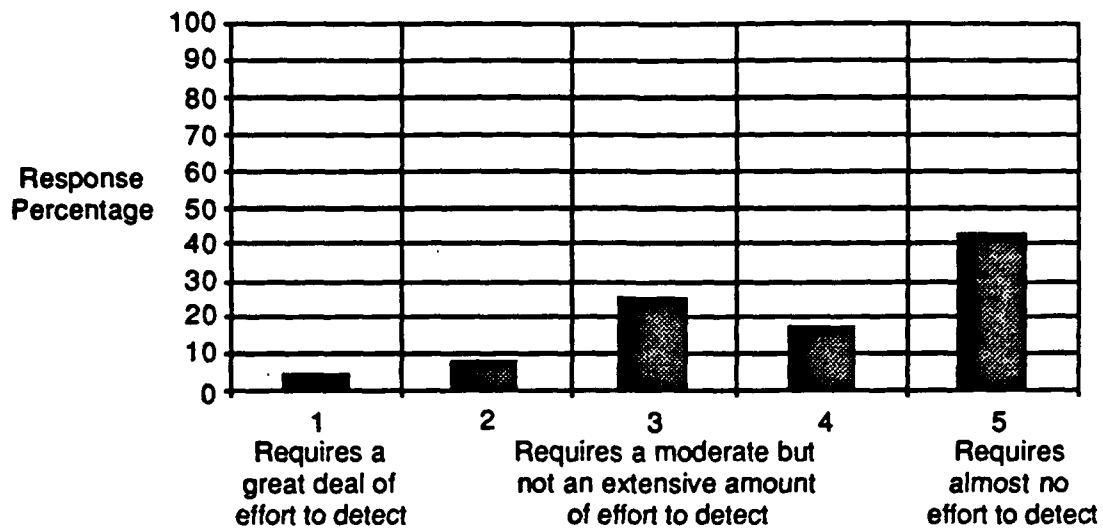


Figure 2. Detectability scale response percentage distributions for the facility ratings.

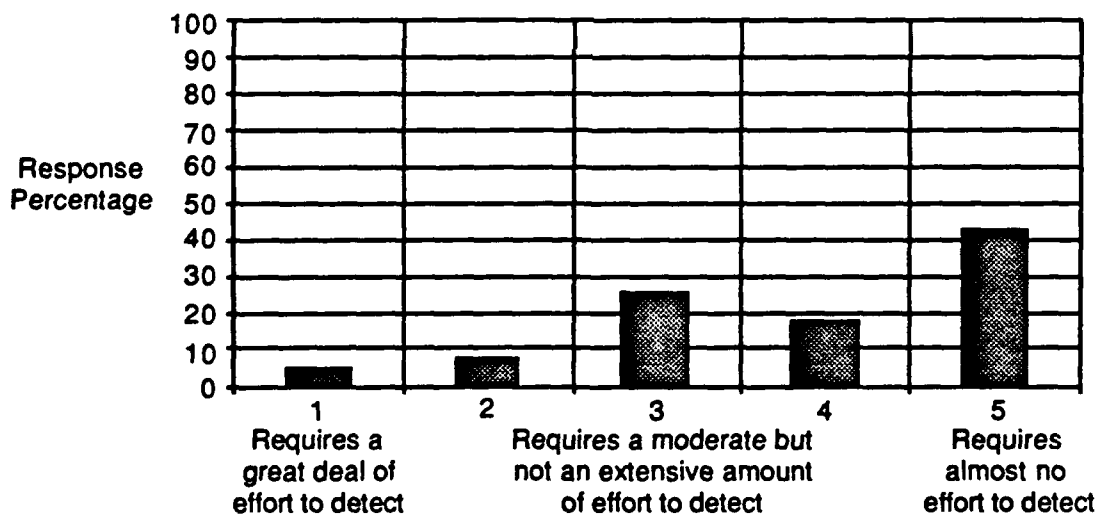


Figure 3. Detectability scale response percentage distributions for the unit ratings.

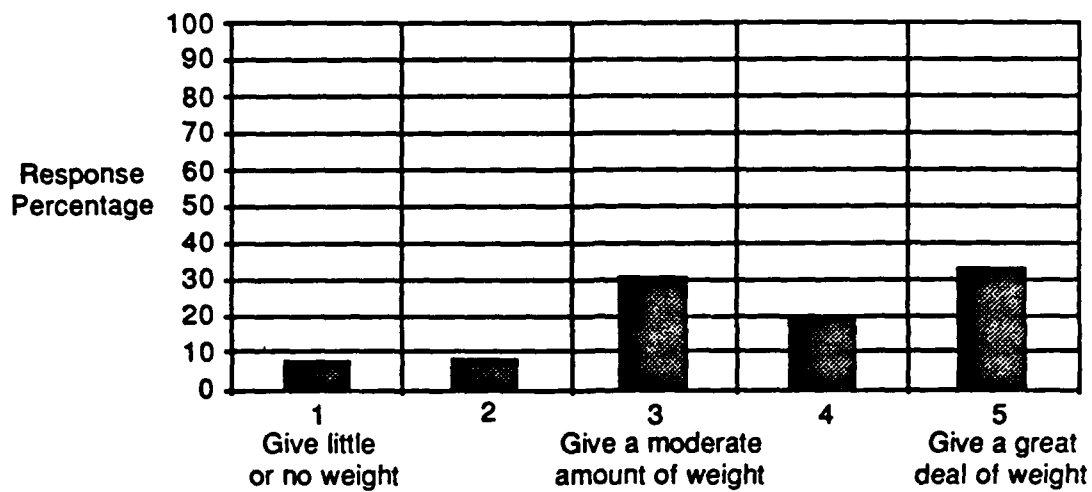


Figure 4. Importance scale response percentage distributions for the facility ratings.

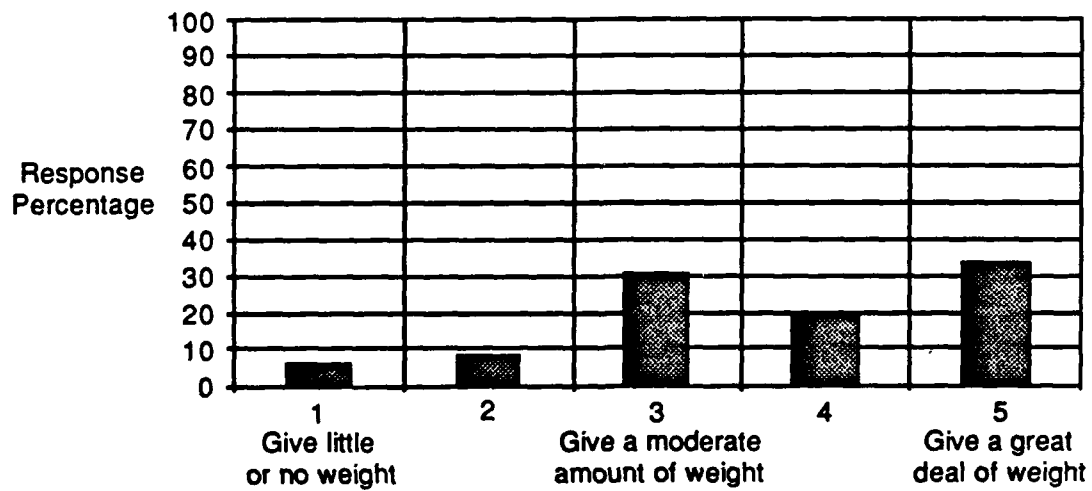


Figure 5. Importance scale response percentage distributions for the unit ratings.

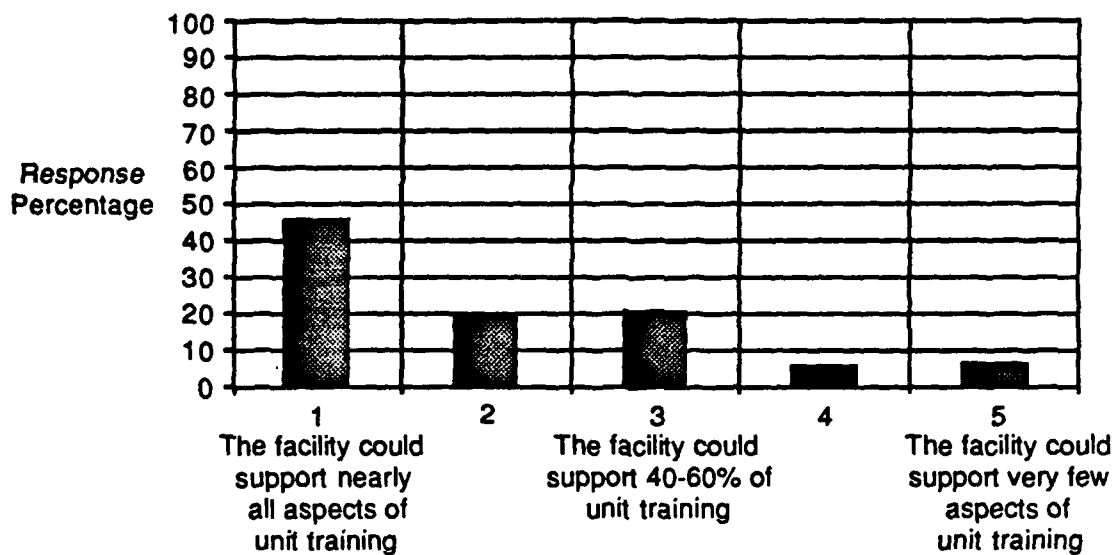


Figure 6. Criticality scale response percentage distributions for the facility ratings.

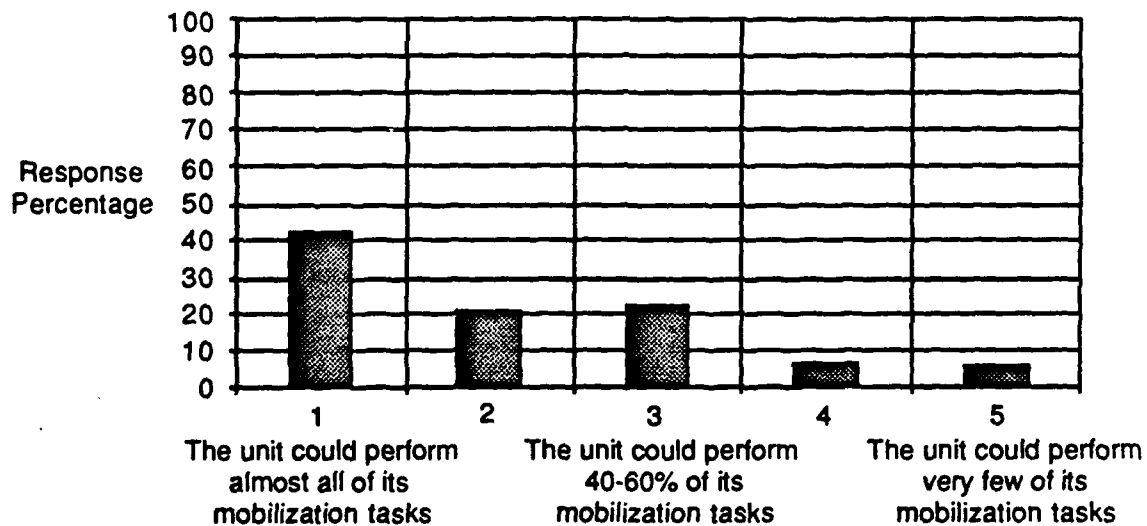


Figure 7. Criticality scale response percentage distributions for the unit ratings.

for the Criticality scale. The responses on the Detectability and Importance scales occur primarily in the middle (ranging from 25% to 30%) and highest rating categories (ranging from 33% to 43%). Approximately 7% of the responses on the Importance and Detectability scales occur in the lowest rating category. In comparison, approximately 45% of the responses on the Criticality scale occur in the lowest rating category; approximately 20% occur in categories 2 and 3; and approximately 7% occur in categories 4 and 5. The differences in response percentage distributions indicate that the Criticality scale should be treated differently than the Detectability and Importance scales.

Functional area level data. Tables 4 through 6 present the response percentages in each rating category, averaged across items in each functional area and across facilities and units, for the Detectability, Importance, and Criticality scales. As depicted by the data in Tables 4 through 6, substantial differences exist in the category response percentages between the individual functional areas for each of the three scales. However, the same general pattern of responses occurs between the individual functional areas for each scale. That is, the Detectability and Importance scales are negatively skewed and the Criticality scale is positively skewed. The differences in response percentages between the three scales (see the line titled "Across Functional Areas" in Tables 4 - 6) are much greater than the differences between functional areas for each scale.

Table 4

## Detectability Scale Response Percentages

Functional Area	<u>Response Category</u>				
	1	2	3	4	5
Aviation Safety Management	6.0	8.5	30.9	17.6	37.3
Facility/Unit Operations	4.6	6.4	22.1	23.8	43.0
Standardization and Training	5.6	6.4	24.1	20.5	43.4
Maintenance Test Flights	4.1	10.3	25.1	16.2	44.3
Aircraft/Flightline Operations	2.1	5.6	25.0	16.1	51.3
Aeromedical Management	1.9	1.3	35.0	10.4	51.3
Crash, Rescue, and Firefighting	4.6	14.9	37.0	12.8	30.6
Petroleum, Oil, and Lubricants	2.0	3.0	22.1	17.4	55.5
Maintenance Management Training	5.5	5.6	31.2	19.0	38.6
Maintenance Quality Control	10.3	12.7	35.8	14.6	26.7
Maintenance Shop Operations	3.0	2.4	13.9	14.9	65.6
Aviation Logistics	11.6	15.3	23.8	18.3	30.9
Aviation Armament	9.7	11.6	24.5	22.4	31.1
Aviation Life Support Equipment	9.7	9.6	19.8	17.7	43.1
Physical Security	7.0	6.1	17.8	21.8	47.2
Across Functional Areas	5.9	8.0	25.9	17.6	42.7

Table 5

## Importance Scale Response Percentages

Functional Area	<u>Response Category</u>				
	1	2	3	4	5
Aviation Safety Management	7.3	12.7	34.0	18.1	28.6
Facility/Unit Operations	6.6	7.4	32.8	24.6	28.7
Standardization and Training	8.2	15.4	31.3	22.4	22.8
Maintenance Test Flights	7.7	10.4	31.7	21.8	28.4
Aircraft/Flightline Operations	9.6	7.3	3.5	16.4	32.5
Aeromedical Management	11.2	7.7	38.3	12.2	30.5
Crash, Rescue, and Firefighting	3.6	4.2	35.9	21.8	34.3
Petroleum, Oil, and Lubricants	2.1	4.0	17.4	19.7	56.8
Maintenance Management Training	5.8	8.2	35.8	19.8	30.2
Maintenance Quality Control	4.6	8.8	26.5	21.5	38.8
Maintenance Shop Operations	1.7	5.1	33.7	26.7	32.6
Aviation Logistics	12.1	19.0	34.2	17.9	16.8
Aviation Armament	10.9	6.5	24.1	17.9	40.5
Aviation Life Support Equipment	1.9	3.1	20.5	17.9	56.6
Physical Security	8.3	13.7	35.2	20.9	22.0
Across Functional Areas	6.8	8.9	31.0	20.0	33.3

Table 6

## Criticality Scale Response Percentages

Functional Area	<u>Response Category</u>				
	1	2	3	4	5
Aviation Safety Management	71.6	15.0	10.5	2.0	1.1
Facility/Unit Operations	34.5	24.7	23.9	8.7	8.2
Standardization and Training	35.9	24.3	21.1	9.5	9.2
Maintenance Test Flights	41.9	18.6	23.1	9.0	7.3
Aircraft/Flightline Operations	53.5	11.3	26.1	4.2	4.7
Aeromedical Management	55.9	15.7	18.5	3.7	6.0
Crash, Rescue, and Firefighting	46.1	25.3	19.8	4.6	4.0
Petroleum, Oil, and Lubricants	35.2	17.3	21.7	7.2	18.6
Maintenance Management Training	26.9	24.6	31.7	8.4	8.4
Maintenance Quality Control	34.2	22.4	24.1	12.7	6.8
Maintenance Shop Operations	62.7	20.3	12.1	1.8	3.0
Aviation Logistics	50.8	21.4	20.4	4.5	2.9
Aviation Armament	21.8	31.2	32.7	5.1	8.9
Aviation Life Support Equipment	32.9	14.8	28.6	12.4	11.3
Physical Security	61.3	21.1	11.8	5.0	0.8
Across Functional Areas	44.3	20.5	21.7	6.6	6.8

## PROCEDURE FOR REVISING THE ARMS CHECKLIST

The results from this research provide useful information to Army decision makers about the Detectability, Importance, and Criticality of each ARMS Checklist item and functional area. This section of the report recommends a three-step procedure for using the Detectability, Importance, and Criticality information to decide whether to retain, revise, or delete a checklist item. The three steps are summarized in the flowchart presented in Figure 8 and are described in detail in the following paragraphs.

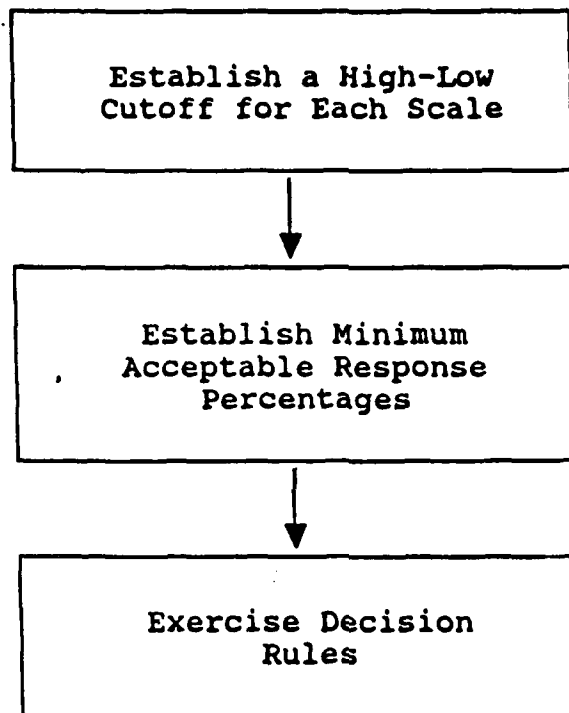


Figure 8. Flowchart showing recommended procedure for revising the ARMS Checklist.

### Step 1: Establish a High-Low Cutoff Point for Each Scale

The first step requires the military decision maker to establish a high-low cutoff point for each of the three scales. The user is reminded that the direction of the original Detectability and Criticality scales was reversed prior to the data analyses. Therefore, each of the three scales progresses from low ratings at the left extreme to high ratings at the right extreme, as shown in Figures 2 through 7. Somewhere along each scale the user must establish a cutoff point dividing the low response categories from the high response categories. High response categories (above the cutoff point) describe

significant deficiencies that should be examined during an ARMS visit, and low response categories (below the cutoff point) describe deficiencies that should not be examined.

Each of the three rating scales has five response categories and three verbal anchors. The verbal anchors for each scale will assist the user in establishing the high-low cutoff point. The portion of the scale that describes significant deficiencies may be different for the three scales. In fact, the verbal anchors and the data shown in Figures 2 through 7 suggest that a different cutoff point should be established for the Importance and Detectability scales than for the Criticality scale. Although there are substantial differences in response percentages between the individual functional areas for all three scales, the shape of the distributions is similar for each scale (see Tables 4 through 6). This suggests that the same scale cutoff point may be used for all functional areas.

As an example, the military user may decide that a facility must be able to support at least 75% of unit training, and that a unit must be able to perform at least 75% of its mobilization tasks. According to the verbal anchors on the Criticality scale shown in Figures 6 and 7, the 75% cutoff point is between the first and second response categories. Therefore, response categories 2 through 5 on the Criticality scale describe significant deficiencies. The military user may also decide that, considering the limited time available and the number of potential deficiencies to be evaluated during an ARMS visit, checklist item deficiencies should be more than moderately detectable and should be given more than a moderate amount of weight. In these cases, according to the verbal anchors shown in Figures 2 through 5, rating categories 4 and 5 on both the Detectability and Importance scales would describe significant deficiencies that should be evaluated.

## Step 2: Establish Minimum Response Percentages

The second step requires the user to establish the minimum response percentage that will determine if an item is above the scale cutoff point established in Step 1. Items with response percentages equal to or greater than the minimum percentage will be considered high on the scale of interest. Checklist items with response percentages lower than the minimum percentage will be considered low on the scale of interest.

The response percentages presented in Tables 4 through 6 provide empirical data for determining the minimum response percentages for each scale. Establishment of the minimum percentage is illustrated using the high-low cutoff points described in the example for Step 1. Across all items, approximately 55% of the Criticality responses occur in rating categories 2 through 5. Approximately 60% of the Detectability responses and 53% of the Importance responses occur in rating



categories 4 and 5. These data can be used to identify response percentages for checklist items that are substantially different from the expected percentages.

Cohen (1977) suggested that, for categorical data, a percentage that is 10% greater than the expected percentage would probably be statistically significant for relatively small samples. Applying this percentage to the example, checklist items with 65% or more of the responses in categories 2 through 5 on the Criticality scale would be considered to have a high Criticality score. Checklist items with 70% or more of the responses in categories 4 and 5 on the Detectability scale would be considered to have a high Detectability score. Likewise, items with 63% or more of the responses in categories 4 and 5 on the Importance scale would be considered to have a high Importance score.

The Step 2 recommendations are presented as general guidelines; the military user should establish criteria that are considered to be meaningful and useful. For example, a higher adjustment than Cohen's recommended 10% (e.g., 15 or 20%) above the expected response percentage could be imposed if the evaluators decided to set more stringent criteria for the core functional areas.

### Step 3: Exercise Decision Rules

Once the criteria for determining whether a checklist item is high or low on each scale are established, the next step is to decide whether to retain, revise, or delete each item. A recommended set of decision rules for combining the ratings on the three scales is presented in Figure 9. The decision rules should be applied to both the facility ratings and the unit ratings.

The decision process begins with the decision about the checklist item's high-low rating on Criticality. In the decision flowchart, if the Criticality rating is high, the user will proceed to the right; if the rating is not high (i.e., low), the user will proceed to the left and downward.

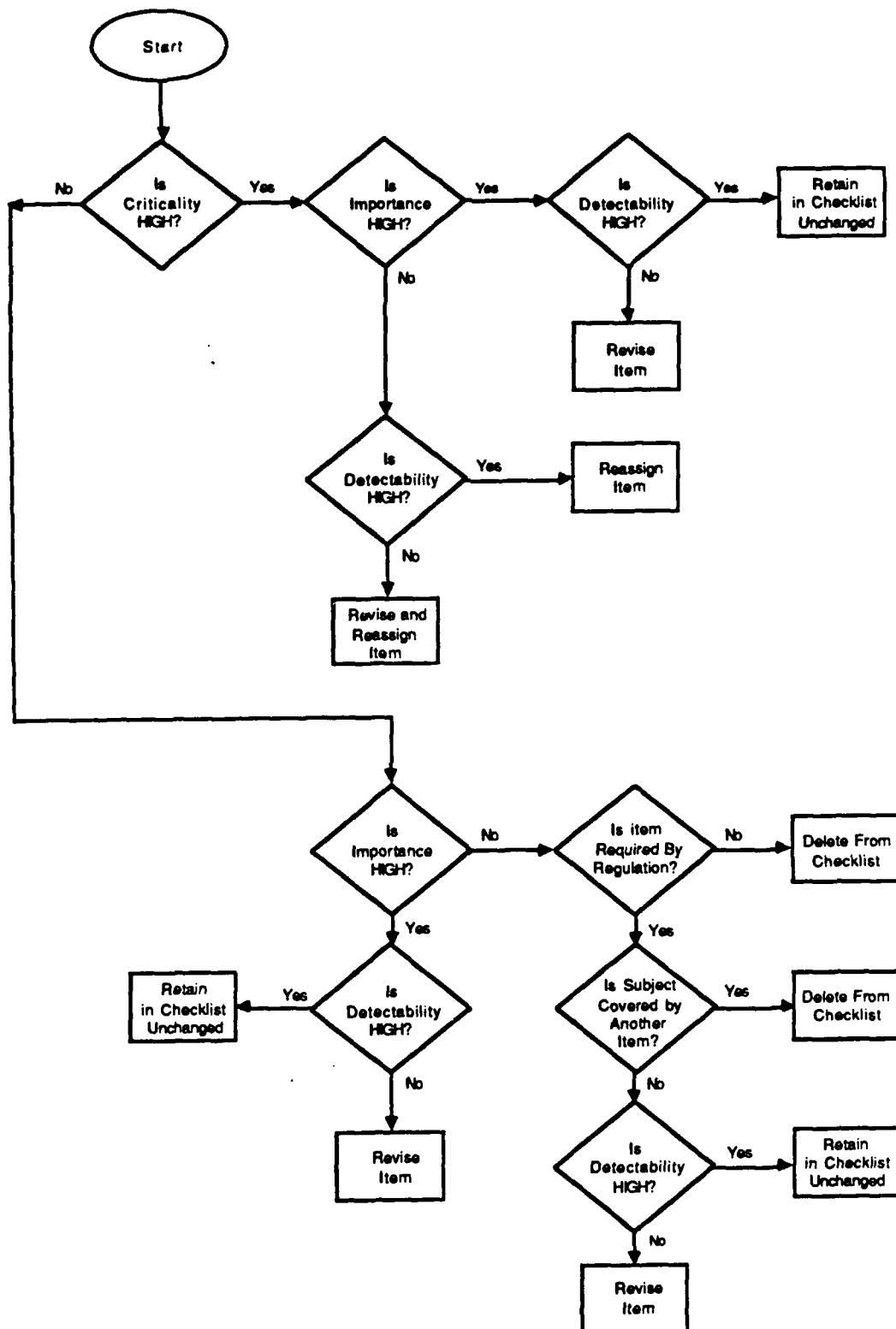


Figure 9. Decision flowchart for retaining, revising, or deleting checklist items.

If the item's Criticality, Importance, and Detectability ratings are all high, the item should be retained in the checklist unchanged. If only the Detectability rating is low, an attempt should be made to revise the item to improve its Detectability (i.e., state the item more specifically or divide it into more than one item). If the item has a high Criticality rating, a low Importance rating, and a high Detectability rating, it probably is assessing a deficiency in a different functional area. Such an item should be reassigned to a more appropriate functional area. If the item has a high Criticality rating but low Importance and Detectability ratings, it should be revised and reassigned to another functional area.

If the item's Criticality rating is low and the Importance rating also is low, it may be advisable to delete or revise the item, depending on whether:

- the item is required by a current regulation,
- the subject matter is covered in another item, or
- the item has a low Detectability rating.

If the item has a low Criticality rating, a high Importance rating, and a high Detectability rating, it should be retained in the checklist unchanged. If the item has a low Criticality rating, a high Importance rating, and a low Detectability rating, it should be revised to make the deficiency easier to detect.

The examples described above are not exhaustive. Rather, the flowchart is intended to provide a general framework for military decision makers; additional factors may need to be considered when deciding to retain, revise, or delete a checklist item. In addition, items in some functional areas may have low Detectability, Importance, or Criticality ratings for a facility, but have high Detectability, Importance, and Criticality ratings for a unit, or vice versa. Some items may be deleted for either a facility or a unit but retained or revised for the other.

In summary, items whose Detectability, Importance, and Criticality ratings for a facility or a unit are all high most likely should be retained in their present form. The user should consider deleting items with low ratings on all three scales unless one of the conditions illustrated in the flowchart shown in Figure 9 is met. The flowchart also provides decision rules for various combinations of low or high ratings on the three scales.

## DISCUSSION

This section of the report summarizes and discusses the results of the ARMS Checklist evaluation. The section is divided into two parts. The first part discusses the implications of the checklist item rating scale results. The second part discusses the purpose and uses of the ARMS Checklist Data Base.

The data summarized in this report reflect the judgments of RC aviators and nonrated aviation personnel who are responsible for managing one or more of the functional areas in a facility or a unit. The research does not constitute a definitive evaluation of the ARMS Checklist because ratings were not available from other aviation SMEs; however, the results provide useful guidance for improving both the content of the checklist and the procedures used to evaluate RC facilities and units.

### Checklist Item Rating Scale Results

On the average, only 7% of the responses were in the lowest rating category on either the Detectability or the Importance scales. This finding suggests that during an ARMS evaluation visit:

- it would be easy to detect the majority of the deficiencies described in the checklist items, and
- the majority of deficiencies should be given at least a moderate amount of weight.

On the average, 45% of the responses were in the lowest rating category on the Criticality scale, suggesting that, in general:

- a facility with the deficiency described in an item could support most aspects of unit training, and
- a unit with the deficiency described in an item could perform most of its mobilization tasks.

These findings should be interpreted with caution for the following three reasons. First, the respondents were instructed to rate the Criticality, as well as the Detectability and Importance, of each item as if the deficiency were the only deficiency that existed in a facility or in a unit. It may be argued that few of the deficiencies described in the items, in isolation, would either (a) prevent a facility from supporting a unit's training, or (b) prevent a unit from performing its mobilization tasks. Even when several deficiencies exist simultaneously, they may not prevent the accomplishment of the facility or unit mission. Unfortunately, it is impossible to conclude from the data what the effect of different combinations

of deficiencies might be, or to estimate a facility's or unit's capability to overcome such deficiencies.

Second, even though approximately 45% of the responses were in the lowest Criticality rating category for the entire checklist, the percentages vary substantially between the functional areas. The data suggest that, on the whole, the deficiencies described by the items in certain areas (e.g., Aviation Safety Management, Physical Security) may be somewhat less critical to mission accomplishment than the deficiencies described by the items in other areas (e.g., Aviation Armament, Maintenance Management Training). These differences between functional areas are easily identified by examining Tables 4 through 6.

Third, the rating distributions in Figures 2 through 7 and the rating scale verbal anchors suggest that different criteria may be appropriate for the Detectability, Importance and Criticality scales. For example, to retain an item in the checklist, the user may require that (a) 70% or more of the responses be in categories 4 and 5 on the Detectability scale, (b) 63% or more of the responses be in categories 4 and 5 on the Importance scale, and (c) 65% or more of the responses be in categories 2 through 5 on the Criticality scale.

In general, the data indicate that the items received similar ratings for a facility and for a unit. This suggests that developing one checklist to use when evaluating a facility and another checklist to use when evaluating a unit probably is not necessary. Instead, a single checklist should be developed, with the items that apply only to a facility or only to a unit clearly identified. The decision flowchart presented in Figure 9 and described in the previous section provides a set of recommended decision rules for accomplishing this. The flowchart should be applied separately to the facility ratings and to the unit ratings.

As described previously, data are provided in this report for each item and for the group of items used to assess each functional area. The two types of data are intended to serve two different functions. The summary data for each of the functional areas shown in Tables 4 through 6 should be used to establish an operationally significant criterion for each of the three scales and to identify functional areas whose items have lower average Detectability, Importance, and Criticality ratings. The data for the individual items presented in Volume II (Appendix C) should be considered when making decisions about retaining, revising, or deleting specific items. Neither type of summary data, however, provides the basis for determining if additional items are required to make the ARMS evaluation comprehensive.

### ARMS Checklist Data Base

Information contained in the ARMS Checklist Data Base can be used to summarize (a) the ARNG and USAR aviators' ratings of the Detectability, Importance, and Criticality of the checklist items, and (b) the performance of ARNG and USAR units on specific checklist items and functional areas during future ARMS visits. Even before additional data are collected, the data base information will allow the First Army ARMS team to reorganize the checklist by identifying items with similar content and reference publications. In addition, the information can be used to generate reports, to identify recurring specific unit and facility strengths and weaknesses, to identify common areas of strengths and weaknesses, or to process additional data collected for future revisions of the checklist.

## RECOMMENDATIONS

This section presents nine recommendations for improving the ARMS Checklist and evaluation procedure. The recommendations are drawn from the results of the rating data analysis described in this report, observations made by project personnel during ARMS evaluation visits, and discussions with ARMS team members. The first five recommendations suggest changes in the content of the checklist:

- The decision to retain an item in its present form, revise the item, or delete it from the checklist should be based on an assessment of the item's Criticality, Importance, and Detectability ratings for both a facility and a unit.
- Items with high overall Detectability, Importance, and Criticality ratings should be retained in the checklist in their present form.
- Items with low overall ratings on only one or two of the three scales should be revised or reassigned to another functional area according to the decision rules summarized in Figure 9.
- Items with low overall Detectability, Importance, and Criticality ratings probably should be deleted from the checklist unless one of the conditions illustrated in Figure 9 is met.
- A single version of the checklist should be used, rather than separate versions for a facility and a unit. Items that pertain only to a facility or only to a unit should be identified on the single checklist, as illustrated in Figure 10.

The next two recommendations suggest changes to the organization and format of the checklist:

- Each page of the checklist should contain a heading that identifies the functional area and the functional subarea of the items, as shown in Figure 10.
- The ARMS Checklist should be revised so that the items are stated positively as questions (see Figure 10) rather than negatively as deficiencies (cf. Carpenter and Just, 1975; Wickens, 1984). The new question-format items can be linked to the old deficiency-format items by means of a word processing program. In this manner, the deficiency-format can be retained if necessary for informal feedback and formal reports.

## AVIATION RESOURCE MANAGEMENT SURVEY

### Standardization and Training: Aircrew Training Program

Item Number	Facility/ Unit Only	Item Name
229/X		Has a terrain flight training area been designated?
229/?		Has an individual night tactical training program been established?
229/\$	F	Is there an Individual Aircrew Training Folder for each aviator?
229/+		Have all aviators been evaluated and placed in an appropriate Flight Activity Category?
230/q	U	Has the Command established a mission training program?
230/y		Does documentation exist to indicate that new aviators were receiving local area orientations?
230/G		Has the Annual Written Examination been administered to all aviators?

Figure 10. Illustration of recommended changes to the checklist format.

The last two recommendations suggest potential applications of the ARMS Checklist Data Base:

- The ARMS Checklist Data Base should be used as an aid for further refinements to the checklist format. For example, the data base can be used to identify items that deal with the same subject matter or that refer to the same publications. It may be more efficient to group these items. In addition, this information may be useful for determining the sequence of items that will minimize evaluator effort.



- The ARMS Checklist Data Base should be used for several different analyses. Additional data fields can be created to record the facilities and units having observed deficiencies. This will help identify commonly occurring deficiencies, facilitate the preparation of annual summary reports, and increase the quality of feedback to command personnel.

## REFERENCES

- Carpenter, P. A., & Just, M. A. (1975). Sentence comprehension: A psycholinguistic processing model of verification. Psychological Review, 82, (1), 45-73.
- Cohen, J. (1977). Statistical power analysis for the behavioral sciences. New York, NY: Academic Press.
- First U. S. Army (1985). Reserve component commander's guide - Aviation standardization training program evaluation and aviation resource management survey. (First Army Pamphlet 95-1). Fort Meade, MD: Department of the Army.
- Landy, F. J., & Farr, J. L. (1983). The measurement of work performance: Methods, theory, and applications. New York, NY: Academic Press.
- U. S. Army Forces Command. (1984). Specialized training in FORSCOM active component and reserve component units (Regulation 350-3). Fort McPherson, GA: Department of the Army.
- U. S. Army Forces Command. (1980). Reserve component aviation resource management survey checklist. (FORSCOM Form 14-1-R). Fort McPherson, GA: Department of the Army.
- U. S. Army Safety Center. (1984). Guide to aviation resources management for aircraft mishap prevention. Fort Rucker, AL: Department of the Army.
- Wickens, C. D. (1984). Engineering psychology and human performance. Columbus, OH: Charles. E. Merrill.

## APPENDIX A

### ABRIDGED VERSION OF THE AVIATION RESOURCE MANAGEMENT SURVEY CHECKLIST

\*1A Pam 95-1

1A Pamphlet  
Number 95-1

#### Reserve Components Commander's Guide Aviation Standardization and Training Program Evaluation and Aviation Resource Management Survey

This pamphlet has been published to provide a standardized uniform method to evaluate or survey RC aviation assets within First United States Army area.

Neither masculine nor feminine genders have been used; however, should the word "he" appear, it applies to both genders unless otherwise specified.

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\*This Pamphlet supersedes 1A Pam 95-1, dated 1 October 1983.

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## Part A

## General

1. Purpose: This pamphlet has been prepared for use in the conduct of Aviation Standardization and Training Program Evaluations and Aviation Resource Management Surveys performed on Reserve Component Commands and their organic, assigned or attached aviation assets. The purpose of the guide is to provide a uniform format for conducting and reporting results of evaluations/inspections/surveys/visits performed in accordance with paragraphs 3-13 and 3-20, FORSCOM Reg 350-3 and AR 385-95 with applicable supplements. The guide does not replace the applicable edition of the US Army Safety Center Guide to Aviation Resources Management for Aircraft Mishap Prevention, established as the FORSCOM ARMS standard publication, but augments the guide to facilitate timely report preparation in a uniform format. It is not suggested that the guide be used as a single source document in preparing for surveys and evaluations. US Army Safety Center Guide to Aviation Resources Management for Aircraft Mishap Prevention, with local references update and other applicable HQDA, NGB, FORSCOM and First Army publications are recommended as preparation guides.

2. Organization: The guide contains significant items that impact on Reserve Component Aviation elements' safety and readiness or have been designated as special subjects for evaluation by FORSCOM or higher headquarters. First Army identified special subjects apply to USAR only. The number of comments/pages that are used to cover a specific area or subarea should not be used to determine the importance of any given area.

3. Evaluation/Survey Ratings, Standards, Briefings, Reports, and Corrective Action Plan:

a. Ratings: An aviation element will receive one of two overall ratings, satisfactory or unsatisfactory, for an evaluation or a survey. Major functional areas will also be rated satisfactory or unsatisfactory. Subareas which will appear in the report may also be rated unsatisfactory; however, the absence of the words satisfactory or unsatisfactory mean the subarea was awarded a satisfactory rating. The evaluation of the Army Aviation Support Facilities and Army Aviation Flight Activities satisfies the Inspector General inspection requirement IAW 1A Reg 350-15.

b. Standards: The overall rating for an evaluation or a survey will be based upon the relative significance of functional areas to overall safety practices, directives compliance and training/readiness. All 12 functional areas listed in Part B are not applicable to all elements; therefore, only applicable areas will be evaluated and rated. Six principal functional areas apply to all elements subject to evaluations or surveys - Safety Management, Facility/Unit Operations, Standardization and Training, Aircraft Operations, Maintenance Management, and Aviation Life Support Equipment. Normally, unsatisfactory ratings on any two of the principal areas will constitute an overall unsatisfactory. An overall unsatisfactory may be awarded when any one

of six principal areas and any two of the other six areas are rated unsatisfactory. Because the type aviation elements and situations confronting these elements vary throughout First US Army, these standards are somewhat flexible and will be applied with judgment.

c. Briefings: Chief, ARMS evaluation team will give an entrance briefing. The purpose is to outline the evaluation, ratings, outbriefing, report, and corrective plan procedures to the commanders/supervisors of the facilities, activities, and units and their staffs. After the completion of each evaluation, the team will conduct an in-depth exit briefing for the facilities, activities, and units. Upon the conclusion of the ARMS evaluations within a Major US Army Reserve Command or State, the ARMS team will conduct a formal exit briefing for the Commander of the MUSARC or the Adjutant General of the State or his designated representative.

d. Reports: Upon conclusion of the ARMS evaluation, an unofficial list of the discrepancies/findings, gradeslips, and observation sheets will be provided to the commanders/supervisors of the facilities, activities, and units. This will be done during the outbriefing. A formal written report will be prepared and distributed within 60 days of the evaluation. It will provide a summary of the evaluation's ratings, commendable areas, and subjects of concern. The report will include separate enclosures for each facility and unit that were evaluated. Enclosures will identify each discrepancy with applicable reference(s), flight evaluation gradeslips, and observation sheets. Areas within each enclosure requiring corrective action will be designated with an asterisk.

e. Corrective Action Plan: The formal written report will designate specific discrepancies with asterisks. The address will submit a corrective plan to this Headquarters, ATTN: AFKA-TR-A, by the designated suspense date within the report. The Aviation Division will review the corrective action plan and will initiate assistance action through the Centralized Aviation Readiness Training Team and staffs within First US Army, US Army Forces Command, and other Army agencies.

4. Evaluation/Survey Comments: Coding of comments within the guide facilitate processing of reports. Following is an explanation of the coding system:

44	a	Word Processing Equipment Comment Index Number.
		Word Processing Equipment Glossary Code.
G	R	Indicates applicability to Army National Guard.
		Indicates applicability to Army Reserve.

5. Proponent: The proponent agency of the pamphlet is Aviation Division, Office of the Deputy Chief of Staff, Training, Headquarters, First US Army. Questions regarding listed comments in the guide should be addressed to the proponent. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to Commander, First US Army, ATTN: AFKA-TR-A, Fort George G. Meade, Maryland 20755.

# Part B

## Reserve Components Commander's Guide Aviation Standardization and Training Program Evaluation and

### Aviation Resource Management Survey

1A Pam 95-1

REMARK NO.	REMARKS
APPLIES TO	
226/a	I. AVIATION SAFETY MANAGEMENT: _____
226/b	<u>AVIATION SAFETY OFFICER (ASO)</u>
226/c	An ASO had not been authorized/assigned/appointed.
226/d G	Recommend compliance with para 1-4d, NGR 385-10 and para 1-6d, AR 385-95.
226/e R	Recommend compliance with para 1-6d, AR 385-95 and FORSCOM/TRADOC Suppl 1 to AR 385-95.
226/f	ASO was not school trained.
226/g G	Recommend compliance with para 1-4c(6), NGR 385-10, and AR 385-95, paragraphs 1-6d and 1-7a(11).
226/h R	Recommend compliance with para 1-6d and 1-7a(11)(d), AR 385-95 and FORSCOM/TRADOC Suppl 1 to AR 385-95.
226/i	ASO had not performed or documented the following duties as appropriate:
226/j	Observed flight and ground operations to detect and correct unsafe practices.
226/k	Conduct hazard analysis, rank hazards in terms of severity and accident probability, and advised responsible officials promptly.
226/l	Educate aircrew members on safety related subjects.
226/m	Review aircraft accident reports and help implement corrections.
226/n	Rehearse and review adequacy of the preaccident plan.
226/o	Ensure that communication equipment, navigation aids, and other electronic aids to aircraft operations are inspected.
226/p	Inspect physical condition of airfields, heliports, and tactical landing sites for hazards; recommend improvements; and insure that all known hazards are publicized.
226/q	Maintain current reference files of aviation safety literature.
226/r	Maintain organizational aircraft accident records.
226/s	Review aviation flight records and the unit training program and make recommendations to correct deficiencies.



AVIATION RESOURCE MANAGEMENT SURVEY

1A Pam 95-1

REMARK NO.	REMARKS	
APPLIES TO		
226/t		Advise all aviators on safety and the importance of following standard procedures and techniques.
226/u		Monitor techniques and proficiency of personnel in handling weapons, ammunition; and petroleum, oil and lubricants (POL).
226/v		Observe aviation maintenance operations and make recommendations to correct unsafe procedures and practices.
226/w		Manage Operational Hazard Report (OHR) functions.
226/x		Monitor the FOD prevention functions.
226/y		Advise and assist aircraft accident investigation boards.
226/z		Analyze accidents and results of accident prevention surveys.
226/[		Monitor aviation life support equipment (ALSE) and related survival training programs.
226/;		Take part in mission planning to insure weather, terrain, areas of operation, and crew and aircraft capabilities are considered.
226/'		Perform other duties as outlined in DA Pam 385-95.
226/2	G	Recommend compliance with para 1-5b(4), NGR 385-10 and para 1-7c, AR 385-95.
226/3	R	Recommend compliance with para 1-7c, AR 385-95.
226/.		<u>AVIATION SAFETY COUNCILS/MEETINGS</u>
226//		An aviation safety council had not been established.
226/A	G	Recommend compliance with para 1-6a, NGR 385-10 and para 5-2, NGR 95-1.
226/B	R	Recommend compliance with para 2-7, AR 385-95.
226/C		Aviation safety council did not include appropriate membership.
226/D	G	Recommend compliance with para 1-6a, NGR 385-10 and para 2-7, AR 385-95.
226/E	R	Recommend compliance with para 2-7, AR 385-95.
0009/a		Command Safety and Occupational Health Advisory Council Committee did not have at least one aviation representative.
0009/b	G	Recommend compliance with para 1-4d(3), NGR 385-10.
0009/c	R	Recommend compliance with para 2-7e, FORSCOM/TRADOC Suppl 1 to AR 385-95

## APPENDIX B

### ABRIDGED VERSION OF THE ARMS CHECKLIST RATING BOOKLET FOR THE AIRCRAFT/FLIGHTLINE OPERATIONS FUNCTIONAL AREA

#### AVIATION RESOURCE MANAGEMENT SURVEY (ARMS) CHECKLIST ITEM QUESTIONNAIRE

During an Aviation Resource Management Survey (ARMS), several functional areas (e.g. aviation safety management, standardization and training, maintenance management) that are critical to the mission of an aviation support facility and of a Reserve Component (RC) aviation unit are evaluated by an ARMS team. A number of items that identify specific deficiencies are used as evaluative guides by the ARMS team members. Information from these items is used to assign an overall rating of Satisfactory or Unsatisfactory to the facility and units evaluated. Constructive feedback based on the findings from the ARMS is, in turn, provided to a facility or to a unit about its strengths and weaknesses.

The First U. S. Army Deputy Chief of Staff for Training (DCST), Aviation Division, has requested that the Army Research Institute for the Behavioral and Social Sciences (ARI) conduct research to evaluate the checklist and procedure used by the First Army ARMS team, to identify problems that may exist, and to recommend ways in which the checklist and procedure can be improved. This questionnaire is part of that effort. The purpose of the questionnaire is to obtain the judgments of subject matter experts such as yourself about certain characteristics of the checklist items. The research findings will be used to improve the ARMS and to provide operationally useful feedback to Reserve Component command personnel, and will be valuable to ARMS teams from all the Continental U. S. Armies.

On page 5 of the questionnaire, you will be asked to provide some general demographic information. This information will help ARI to understand the rating data you provide. On page 6 you will find definitions of three characteristics of the checklist items. Read the definitions carefully, and refer to them as necessary. Two sample items are shown on page 7 and on page 8. Please review the examples before beginning the rating task. Page 9 contains a brief explanation of the two examples.

Located at the top of each of the remaining pages in the questionnaire is an item that is currently used in the First Army ARMS checklist, and the functional area from which the item is taken. Each item describes a deficiency that may be found in a support facility or in a unit. Below the item are two sets of rating items - rating items 1, 2, and 3 are to be used to rate a facility; rating items 4, 5, and 6 are to be used to rate a unit.

After you have completed the questionnaire booklet, please mail it to ARI at the following address:

ARI Aviation Research and Development Activity  
ATTN: PERI-IR (ARMS)  
Fort Rucker, Alabama 36362-5354

We appreciate your cooperation. Your responses will be confidential and will be used for research purposes only.

*Please turn the page and begin.*

DATA REQUIRED BY THE PRIVACY ACT OF 1974 (5 U.S.C. 552a)	
TITLE OF FORM Aviation Resource Management Survey (ARMS) Checklist Item Questionnaire	PRESCRIBING DIRECTIVE
1. AUTHORITY	
2. PRINCIPAL PURPOSE(S)	
<p>The data collected with the attached questionnaire are to be used for research purposes only.</p>	
3. ROUTINE USES	
<p>The purpose of the research is to evaluate the content and procedure used to conduct the Aviation Resource Management Survey (ARMS) in First Army Reserve Component (RC) facilities and units. The research will provide information about (a) critical RC facility and unit deficiencies that should be evaluated during an ARMS visit, (b) improved procedures for using a checklist to evaluate RC facilities and units, and (c) improved procedures for managing and interpreting evaluative information from ARMS visits.</p> <p>When an identifier (e.g., Social Security Number) is required, it is to be used for administrative and statistical control purposes within the confines of the subject research. Full confidentiality of the response will be maintained.</p>	
4. MANDATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION	
<p>Your participation in the research is strictly voluntary. You are encouraged to provide complete and accurate information in the interests of the research, but there will be no effect on you for not providing all, or any part of, the information.</p> <p>You may detach this notice from the questionnaire if you desire to do so.</p>	
FORM	

- Privacy Act Statement - 26 Sep 75

PT CONTROL NUMBER: 5650A

DA CONTROL NUMBER:

# SUBJECT MATTER EXPERT DEMOGRAPHIC INFORMATION

Check [ ☒ ] the appropriate box or write the required information in the appropriate space.

1. What are the last four digits of your social security number? \_\_\_\_\_
2. Which of the following best describes your present duty position? (check only one)
 

[ 1 ]	Aviation Resource Management Survey (ARMS) Team Member
[ 2 ]	Centralized Aviation Readiness Training (CART) Team Member
[ 3 ]	Outside Evaluation Specialist (e.g., SIP, MTFE)
[ 4 ]	Full-time Federal Technician Assigned to an ARNG Support Facility
[ 5 ]	Full-time Federal Technician Assigned to a USAR Facility
[ 6 ]	Member of an ARNG unit, but not a Full-time Federal Technician at an ARNG Facility
[ 7 ]	Member of a USAR unit, but not a Full-time Federal Technician at a USAR Facility
[ 8 ]	Other (specify) _____
3. How long have you been in your present duty position? \_\_\_\_\_ and \_\_\_\_\_  
Years Months
4. Indicate the Continental U. S. Army (CONUSA) to which you are assigned.  
[ 1 ] First [ 2 ] Second [ 4 ] Fourth [ 5 ] Fifth [ 6 ] Sixth
5. What is your military grade?
 

[ 1 ]	E-5	[ 6 ]	W-1	[ 10 ]	O-1
[ 2 ]	E-6	[ 7 ]	W-2	[ 11 ]	O-2
[ 3 ]	E-7	[ 8 ]	W-3	[ 12 ]	O-3
[ 4 ]	E-8	[ 9 ]	W-4	[ 13 ]	O-4
[ 5 ]	E-9			[ 14 ]	O-5
				[ 15 ]	O-6
6. How many years/months of total military service do you have? \_\_\_\_\_ and \_\_\_\_\_  
Years Months
7. What is your total number of military flight hours? \_\_\_\_\_ Hours
8. In which of the following functional areas do you consider yourself to have the most knowledge and expertise? (check only one)
 

[ 1 ]	Aeromedical Management	[ 7 ]	Aviation Safety Management
[ 2 ]	Aircraft Crash Rescue and Fire Fighting	[ 8 ]	Aviation Standardization and Training
[ 3 ]	Aircraft/Flight Line Operations	[ 9 ]	Facility/Unit Operations
[ 4 ]	ATC Management/Training	[ 10 ]	Maintenance Management
[ 5 ]	Aviation Armament	[ 11 ]	POL Facilities and Operations
[ 6 ]	Aviation Life Support Equipment	[ 12 ]	Physical Security
9. Have you ever served in an aviation position in the Army National Guard ?
 

[ 0 ]	No
[ 1 ]	Yes • If Yes, indicate your <u>total</u> time: _____ and _____ Years Months
10. Have you ever served in an aviation position in the Army Reserve ?
 

[ 0 ]	No
[ 1 ]	Yes • If Yes, indicate your <u>total</u> time: _____ and _____ Years Months

Please turn to page 6 and review the definitions of the rating scales.

## DEFINITIONS OF RATING SCALES

Listed below are definitions of the three characteristics of the checklist items that you will rate. The characteristics are defined first, as they apply to an *aviation support facility*, and second, as they apply to a *Reserve Component aviation unit*. Please read each definition carefully before you begin the rating task. Refer to the definitions as often as necessary.

### ***Support Facility***

<b><i>Item Detectability</i></b>	The relative ease or difficulty of determining, during an ARMS evaluation, if the deficiency exists in a support facility
<b><i>Functional Area Importance</i></b>	The amount of weight that the deficiency should be given when evaluating <i>Aviation Standardization and Training</i> in a support facility
<b><i>Mission Criticality</i></b>	The extent to which a facility with the deficiency can support the training of a Reserve Component unit

### ***Reserve Component Unit***

<b><i>Item Detectability</i></b>	The relative ease or difficulty of determining, during an ARMS evaluation, if the deficiency exists in a Reserve Component unit
<b><i>Functional Area Importance</i></b>	The amount of weight that the deficiency should be given when evaluating <i>Aviation Standardization and Training</i> in a Reserve Component unit
<b><i>Mission Criticality</i></b>	The extent to which a Reserve Component unit with the deficiency can perform its mobilization mission

**Note:** When making your ratings of the characteristics, assume that the deficiency described in each item is the **ONLY** deficiency that exists in a facility or in a unit.

Please turn the page and review Sample Items 1 and 2.

# SAMPLE ITEM 1

Presented below is a checklist item that has been used to evaluate *Ground Traffic Control* in an aviation support facility or in a Reserve Component (RC) aviation unit. Check [✓] the response alternative in rating items 1 - 6 that you consider to be most appropriate.

*Pedestrian walkways to Operations Area  
were not marked clearly.*

Note: Rating Items 1 - 3 Apply to a *Facility*

1. How much effort would it take to detect the deficiency described in this item when evaluating a *facility* during an ARMS visit?

[✓] [ 1 ]  
It would take almost  
no effort to detect  
this deficiency

[ 2 ] [ 3 ] [ 4 ]  
It would take a moderate, but  
not an extensive amount of  
effort to detect this deficiency

[ 5 ]  
It would take a great  
deal of effort to detect  
this deficiency

2. How much weight should the deficiency described in this item be given when evaluating *Ground Traffic Control* in a *facility*?

[ 1 ] [ 2 ] [ 3 ] [ 4 ] [✓]  
The deficiency should  
be given little  
or no weight

[ 1 ] [ 2 ] [ 3 ] [ 4 ] [✓]  
The deficiency should  
be given a moderate  
amount of weight

[ 1 ] [ 2 ] [ 3 ] [ 4 ] [✓]  
The deficiency should  
be given a great deal  
of weight

3. To what extent could a *facility* with the deficiency described in this item support the training of a Reserve Component unit?

[ 1 ] [ 2 ] [ 3 ] [✓] [ 5 ]  
The facility could  
support very few aspects  
of unit training

[ 1 ] [ 2 ] [ 3 ] [✓] [ 5 ]  
The facility could  
support 40-60%  
of unit training

[ 1 ] [ 2 ] [ 3 ] [✓] [ 5 ]  
The facility could  
support nearly all aspects  
of unit training

Note: Rating Items 4 - 6 Apply to a *Unit*

4. How much effort would it take to detect the deficiency described in this item when evaluating a *unit* during an ARMS visit?

[✓] [ 2 ] [ 3 ] [ 4 ] [ 5 ]  
It would take almost  
no effort to detect  
this deficiency

[✓] [ 2 ] [ 3 ] [ 4 ] [ 5 ]  
It would take a moderate, but  
not an extensive amount of  
effort to detect this deficiency

[✓] [ 2 ] [ 3 ] [ 4 ] [ 5 ]  
It would take a great deal  
of effort to detect  
this deficiency

5. How much weight should the deficiency described in this item be given when evaluating *Ground Traffic Control* in a *unit*?

[ 1 ] [ 2 ] [✓] [ 4 ] [ 5 ]  
The deficiency should  
be given little  
or no weight

[ 1 ] [ 2 ] [✓] [ 4 ] [ 5 ]  
The deficiency should be  
given a moderate  
amount of weight

[ 1 ] [ 2 ] [✓] [ 4 ] [ 5 ]  
The deficiency should be  
given a great deal  
of weight

6. To what extent could a *unit* with the deficiency described in this item perform its mobilization mission in a satisfactory manner?

[ 1 ] [ 2 ] [ 3 ] [ 4 ] [✓]  
The unit could perform  
very few of its  
mobilization tasks

[ 1 ] [ 2 ] [ 3 ] [ 4 ] [✓]  
The unit could perform  
40-60% of its  
mobilization tasks

[ 1 ] [ 2 ] [ 3 ] [ 4 ] [✓]  
The unit could perform  
almost all of its  
mobilization tasks

## SAMPLE ITEM 2

Presented below is a checklist item that has been used to evaluate *Communications Management* in an aviation support facility or in a Reserve Component (RC) aviation unit. Check [✓] the response alternative in rating items 1 - 6 that you consider to be most appropriate.

*Field radios were not kept in state of repair.*

Note: Rating Items 1 - 3 Apply to a *Facility*

1. How much effort would it take to detect the deficiency described in this item when evaluating a *facility* during an ARMS visit?

[ 1 ]  
It would take almost  
no effort to detect  
this deficiency

[ 2 ]                      [ 3 ] ✓  
It would take a moderate, but  
not an extensive amount of  
effort to detect this deficiency

[ 4 ]                      [ 5 ]  
It would take a great  
deal of effort to detect  
this deficiency

2. How much weight should the deficiency described in this item be given when evaluating *Communications Management* in a *facility*?

[ 1 ]  
The deficiency should  
be given little  
or no weight

[ 2 ] ✓                      [ 3 ]  
The deficiency should  
be given a moderate  
amount of weight

[ 4 ]                      [ 5 ]  
The deficiency should  
be given a great deal  
of weight

3. To what extent could a *facility* with the deficiency described in this item support the training of a Reserve Component unit?

[ 1 ]  
The facility could  
support very few aspects  
of unit training

[ 2 ]                      [ 3 ] ✓  
The facility could  
support 40-60%  
of unit training

[ 4 ]                      [ 5 ]  
The facility could  
support nearly all aspects  
of unit training

Note: Rating Items 4 - 6 Apply to a *Unit*

4. How much effort would it take to detect the deficiency described in this item when evaluating a *unit* during an ARMS visit?

[ 1 ]  
It would take almost  
no effort to detect  
this deficiency

[ 2 ]                      [ 3 ]                      [ 4 ] ✓  
It would take a moderate, but  
not an extensive amount of  
effort to detect this deficiency

[ 5 ]  
It would take a great deal  
of effort to detect  
this deficiency

5. How much weight should the deficiency described in this item be given when evaluating *Communications Management* in a *unit*?

[ 1 ]  
The deficiency should  
be given little  
or no weight

[ 2 ]                      [ 3 ]  
The deficiency should be  
given a moderate  
amount of weight

[ 4 ]                      [ 5 ] ✓  
The deficiency should be  
given a great deal  
of weight

6. To what extent could a *unit* with the deficiency described in this item perform its mobilization mission in a satisfactory manner?

[ 1 ]  
The unit could perform  
very few of its  
mobilization tasks

[ 2 ] ✓                      [ 3 ]  
The unit could perform  
40-60% of its  
mobilization tasks

[ 4 ]                      [ 5 ]  
The unit could perform  
almost all of its  
mobilization tasks

## EXPLANATION OF SAMPLE ITEMS

Sample Items 1 and 2 show you how an SME might use the rating scales. Both Sample Items 1 and 2 are fictitious, and are not part of the First Army ARMS Checklist. Likewise, *Communications Management* and *Ground Traffic Control* are not functional areas evaluated during an ARMS. The sample items are provided to demonstrate two important points about the rating task.

***First, the deficiency described in the item may be important for evaluating a facility's or unit's status in a functional area, but may not be critical to the capability of the facility or unit to accomplish its mission.***

In Sample Item 1, the SME judged that having pedestrian walkways to the Operations Area that were not marked clearly was important for the evaluation of *Ground Traffic Control* in the *facility* (see rating item 2), but that the deficiency was not critical to the *facility's* capability of supporting the training of a Reserve Component unit (see rating item 3).

***Second, the Item Detectability, Functional Area Importance, and Mission Criticality of the deficiency described in an item may be different for a facility than for a unit.***

In Sample Item 2, the SME judged that not having field radios in a state of repair was more important for evaluating *Communications Management* in a *unit* (see rating item 5) than for evaluating *Communications Management* in a *facility* (see rating item 2).

*Once you have finished reviewing the sample items, please turn to page 11 and begin the rating task.*



Presented below is a checklist item that has been used to evaluate *Aircraft/Flight Line Operations* in an aviation support facility or in a Reserve Component (RC) aviation unit. Check [✓] the response alternative in rating items 1 - 6 that you consider to be most appropriate.

*Appropriate numbers of first aid kits were not available in each aircraft.*

Note: Rating Items 1 - 3 Apply to a *Facility*

1. How much effort would it take to detect the deficiency described in this item when evaluating a *facility during an ARMS visit*?
 

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
It would take almost no effort to detect this deficiency		It would take a moderate, but not an extensive amount of effort to detect this deficiency		It would take a great deal of effort to detect this deficiency
2. How much weight should the deficiency described in this item be given when evaluating *Aircraft/Flight Line Operations* in a *facility*?
 

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
The deficiency should be given little or no weight		The deficiency should be given a moderate amount of weight		The deficiency should be given a great deal of weight
3. To what extent could a *facility* with the deficiency described in this item support the training of a Reserve Component unit?
 

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
The facility could support very few aspects of unit training		The facility could support 40-60% of unit training		The facility could support nearly all aspects of unit training

Note: Rating Items 4 - 6 Apply to a *Unit*

4. How much effort would it take to detect the deficiency described in this item when evaluating a *unit during an ARMS visit*?
 

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
It would take almost no effort to detect this deficiency		It would take a moderate, but not an extensive amount of effort to detect this deficiency		It would take a great deal of effort to detect this deficiency
5. How much weight should the deficiency described in this item be given when evaluating *Aircraft/Flight Line Operations* in a *unit*?
 

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
The deficiency should be given little or no weight		The deficiency should be given a moderate amount of weight		The deficiency should be given a great deal of weight
6. To what extent could a *unit* with the deficiency described in this item perform its mobilization mission in a satisfactory manner?
 

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
The unit could perform very few of its mobilization tasks		The unit could perform 40-60% of its mobilization tasks		The unit could perform almost all of its mobilization tasks

Presented below is a checklist item that has been used to evaluate *Aircraft/Flight Line Operation* in an aviation support facility or in a Reserve Component (RC) aviation unit. Check [✓] the response alternative in rating items 1 - 6 that you consider to be most appropriate.

*Appropriate numbers of fire extinguishers were not available in each aircraft.*

Note: Rating Items 1 - 3 Apply to a *Facility*

1. How much effort would it take to detect the deficiency described in this item when evaluating a *facility during an ARMS visit*?

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
It would take almost no effort to detect this deficiency		It would take a moderate, but not an extensive amount of effort to detect this deficiency		It would take a great deal of effort to detect this deficiency

2. How much weight should the deficiency described in this item be given when evaluating *Aircraft/Flight Line Operation in a facility*?

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
The deficiency should be given little or no weight		The deficiency should be given a moderate amount of weight		The deficiency should be given a great deal of weight

3. To what extent could a *facility* with the deficiency described in this item support the training of a Reserve Component unit?

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
The facility could support very few aspects of unit training		The facility could support 40-60% of unit training		The facility could support nearly all aspects of unit training

Note: Rating Items 4 - 6 Apply to a *Unit*

4. How much effort would it take to detect the deficiency described in this item when evaluating a *unit during an ARMS visit*?

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
It would take almost no effort to detect this deficiency		It would take a moderate, but not an extensive amount of effort to detect this deficiency		It would take a great deal of effort to detect this deficiency

5. How much weight should the deficiency described in this item be given when evaluating *Aircraft/Flight Line Operation in a unit*?

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
The deficiency should be given little or no weight		The deficiency should be given a moderate amount of weight		The deficiency should be given a great deal of weight

6. To what extent could a *unit* with the deficiency described in this item perform its mobilization mission in a satisfactory manner?

[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]	[ 5 ]
The unit could perform very few of its mobilization tasks		The unit could perform 40-60% of its mobilization tasks		The unit could perform almost all of its mobilization tasks

AFL0002

***You have completed all the items in the questionnaire booklet.***

***Again, thank you for your cooperation.***

***Please mail the questionnaire booklet to:***

***ARI Aviation Research and Development Activity  
ATTN: PERI-IR (ARMS)  
Fort Rucker, Alabama 36362-5354***